SEQUENCE LISTING

<110> Tian, Jing-Hui
Walker, Richard I.
Jackson, W. James

<120> Helicobacter proteins, gene sequences and uses thereof

<130> 7969-088

<140> To Be Assigned
<141> 2000-11-28

<160> 44

<170> PatentIn Ver. 2.1

<210> 1
<211> 1476
<212> DNA
<213> Helicobacter sp.

<400> 1
atggaattga atcaaccacc actccctaca gaaattgatg gtgacgctta tcataagccg 60
agttttaatg atttgggctt aaaagaatcg gttttaaaat ccgtttatga agccggcttc 120
acttccccaa gccccattca agaaaaggcc attccggctg ttttgcaagg ccgagatgtc 180
atcgcacaag cccaaacagg cacaggaaaa accgccgctt tcgctctgcc cattatcaac 240
aaccttaaaa acaaccacac catagaagcc ctagtgatca cgcccaccag agaattagcc 300
atgcaaatta gcgatgagat tttcaaattg ggcaaacaca ccaggactaa aaccgtgtgc 360
gtgtatggag gccagagcgt taaaaagcaa tgcgaattca ttaagaaaaa tccccaagtg 420
atgatcgcta caccaggaag gctgctcgat cacttaaaaa acgaacgcat ccataaattt 480
gtgcctaaag tggtcgtttt agatgaaagc gatgaaatgc tggatatggg gtttttagac 540
gatattgaag agatttttga ctacctccct agcgaagcgc agattttgct tttttcagcc 600
acgatgccag agccgattaa aagactagcg gataagattt tagaaaaccc tattaaaatc 660
catatcgctc cttctaatat cactaacacc gacatcaccc aacgctttta tgtgatcaat 720
gagcatgaga gggccgaagc gatcatgcgc cttttagaca cccaagcacc caaaaagagc 780
attgttttca cgcgcactaa aaaagaagcc gatgaattgc accaattcct tgcttctaaa 840
aattacaaaa gcaccgcctt gcatggggat atggatcaaa gggatcggcg ctcttctatc 900
atggcgttta aaaaaaatga cgctgatgtg ttggtggcta cagatgtggc gagtcgtggg 960
ctagatatta gcggtgtaag ccatgtgttt aattaccact tgcccctaaa cactgagagc 1020
tatatccatc gcatcgggag aaccgggcga gcgggcaaaa aaggcatggc gatcacttta 1080
gtaacccctt tagaatacaa agagctttta cgcatgcaaa aagaaattga ttcagagatt 1140
gaacttttg aaatccccac cattaacgaa aatcagatca tcaaaacctt gcatgacgct 1200
aaagtgtctg aagggatcat cagcctttat gaacagctta ccgaaatttt tgagccgtct 1260
caattggttt taaaactttt gagtttgcag tttgaaacca gcaaaattgg cttaaaccag 1320
caagaaattg acgcgattca aaaccctaaa gaaaaaacgc caaaaccctc taacaaaaaa 1380
acgccccaac atgagcgagc gcgttctttc aaaaagggtc agcacagaga cagacaccct 1440
aaaacaaacc attattctaa aaaacccaaa cgccgt 1476

<210> 2
<211> 492
<212> PRT
<213> Helicobacter sp.

<400> 2


```
Met Glu Leu Asn Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala
  1               5                  10                  15

Tyr His Lys Pro Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu
             20                  25                  30

Lys Ser Val Tyr Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu
         35                  40                  45

Lys Ala Ile Pro Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala
     50                  55                  60

Gln Thr Gly Thr Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn
 65                  70                  75                  80

Asn Leu Lys Asn Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr
                 85                  90                  95

Arg Glu Leu Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys
            100                 105                 110

His Thr Arg Thr Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys
        115                 120                 125

Lys Gln Cys Glu Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr
    130                 135                 140

Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe
145                 150                 155                 160

Val Pro Lys Val Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met
                165                 170                 175

Gly Phe Leu Asp Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu
            180                 185                 190

Ala Gln Ile Leu Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg
        195                 200                 205

Leu Ala Asp Lys Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro
    210                 215                 220

Ser Asn Ile Thr Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn
225                 230                 235                 240

Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala
                245                 250                 255

Pro Lys Lys Ser Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu
            260                 265                 270

Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His
        275                 280                 285

Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys
    290                 295                 300
```

Lys Asn Asp Ala Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly
305 310 315 320

Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu
325 330 335

Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly
340 345 350

Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu
355 360 365

Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu
370 375 380

Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala
385 390 395 400

Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile
405 410 415

Phe Glu Pro Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu
420 425 430

Thr Ser Lys Ile Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn
435 440 445

Pro Lys Glu Lys Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His
450 455 460

Glu Arg Ala Arg Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro
465 470 475 480

Lys Thr Asn His Tyr Ser Lys Lys Pro Lys Arg Arg
485 490

<210> 3
<211> 759
<212> DNA
<213> Helicobacter sp.

<400> 3
atggcataca aatatgatag agacttggaa tttttaaagc aattggaatc tagtgattta 60
ttggatttgt ttgaggtgct tgtttttggt aaagacggcg aaaaaagaca caatgaaaaa 120
ctgaccagct ccatagaata caaaaggcat ggcgatgatt acgctaaata cgcagaaaga 180
atcgctgaag agttgcaata ctatgggagc aatagttttg cgagtttcat taaaggcgaa 240
ggagtcttat acaaagagat tttatgcgat gtgtgcgata aattaaaggt caattacaac 300
aagaaaactg aaacgacttt aattgaacaa aacatgcttt ctaaaatctt agaaagaagt 360
ttggaagaaa tggatgatga agaagtgaaa gaaatgtgcg atgaattatc cataaaaaac 420
acggacaatt taaacagaca agccttaagc gcggcgactt taacgctgtt taaaatgggg 480
ggttttaaat cttatcaatt agctgtcatt gttgcgaatg cggtcgcaaa aaccattcta 540
gggcgtggtt tatcgcttgc gggcaatcag gtgcttacaa gaactctgag ctttttaaca 600
ggtcctgttg gctggatcat tacaggcgta tggacagcga ttgatattgc agggccggct 660
tatagggtaa ccataccggc atgcattgtg gttgccactt tacgcctaaa aacacagcaa 720
gccaatggag ataagaagtc gttgcaaata gaatccatt 759

<210> 4
<211> 253
<212> PRT
<213> Helicobacter sp.

<400> 4

```
Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu
  1               5                  10                  15

Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly Lys Asp
             20                  25                  30

Gly Glu Lys Arg His Asn Glu Lys Leu Thr Ser Ser Ile Glu Tyr Lys
         35                  40                  45

Arg His Gly Asp Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu
     50                  55                  60

Leu Gln Tyr Tyr Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu
 65                  70                  75                  80

Gly Val Leu Tyr Lys Glu Ile Leu Cys Asp Val Cys Asp Lys Leu Lys
                 85                  90                  95

Val Asn Tyr Asn Lys Lys Thr Glu Thr Thr Leu Ile Glu Gln Asn Met
            100                 105                 110

Leu Ser Lys Ile Leu Glu Arg Ser Leu Glu Glu Met Asp Asp Glu Glu
        115                 120                 125

Val Lys Glu Met Cys Asp Glu Leu Ser Ile Lys Asn Thr Asp Asn Leu
    130                 135                 140

Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly
145                 150                 155                 160

Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala
                165                 170                 175

Lys Thr Ile Leu Gly Arg Gly Leu Ser Leu Ala Gly Asn Gln Val Leu
            180                 185                 190

Thr Arg Thr Leu Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr
        195                 200                 205

Gly Val Trp Thr Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr
    210                 215                 220

Ile Pro Ala Cys Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln
225                 230                 235                 240

Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile Glu Ser Ile
                245                 250
```

<210> 5
<211> 54
<212> PRT

<213> Helicobacter sp.

<400> 5
Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro Ser Phe Asn Asp Leu
1 5 10 15

Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr Glu Ala Gly Phe Thr
20 25 30

Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro Ala Val Leu Gln Gly
35 40 45

Arg Asp Val Ile Ala Gln
50

<210> 6
<211> 31
<212> PRT
<213> Helicobacter sp.

<400> 6
Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn Asn
1 5 10 15

His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala
20 25 30

<210> 7
<211> 26
<212> PRT
<213> Helicobacter sp.

<400> 7
Ala Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg
1 5 10 15

Thr Lys Thr Val Cys Val Tyr Gly Gly Gln
20 25

<210> 8
<211> 41
<212> PRT
<213> Helicobacter sp.

<400> 8
Val Met Ile Ala Thr Pro Gly Arg Leu Leu Asp His Leu Lys Asn Glu
1 5 10 15

Arg Ile His Lys Phe Val Pro Lys Val Val Val Leu Asp Glu Ser Asp
20 25 30

Glu Met Leu Asp Met Gly Phe Leu Asp
35 40

<210> 9
<211> 31
<212> PRT
<213> Helicobacter sp.

<400> 9
Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu Leu Phe Ser Ala
1 5 10 15

Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys Ile Leu Glu
20 25 30

<210> 10
<211> 23
<212> PRT
<213> Helicobacter sp.

<400> 10
Asn Glu His Glu Arg Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln
1 5 10 15

Ala Pro Lys Lys Ser Ile Val
20

<210> 11
<211> 36
<212> PRT
<213> Helicobacter sp.

<400> 11
Ala Asp Glu Leu His Gln Phe Leu Ala Ser Lys Asn Tyr Lys Ser Thr
1 5 10 15

Ala Leu His Gly Asp Met Asp Gln Arg Asp Arg Arg Ser Ser Ile Met
20 25 30

Ala Phe Lys Lys
35

<210> 12
<211> 41
<212> PRT
<213> Helicobacter sp.

<400> 12
Gly Leu Asp Ile Ser Gly Val Ser His Val Phe Asn Tyr His Leu Pro
1 5 10 15

Leu Asn Thr Glu Ser Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala
20 25 30

Gly Lys Lys Gly Met Ala Ile Thr Leu
35 40

<210> 13
<211> 31
<212> PRT
<213> Helicobacter sp.

<400> 13
Arg Ala Gly Lys Lys Gly Met Ala Ile Thr Leu Val Thr Pro Leu Glu
1 5 10 15

Tyr Lys Glu Leu Leu Arg Met Gln Lys Glu Ile Asp Ser Glu Ile
20 25 30

<210> 14
<211> 36
<212> PRT
<213> Helicobacter sp.

<400> 14
Ile Pro Thr Ile Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala
1 5 10 15

Lys Val Ser Glu Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile
20 25 30

Phe Glu Pro Ser
35

<210> 15
<211> 21
<212> PRT
<213> Helicobacter sp.

<400> 15
Ser Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys
1 5 10 15

Ile Gly Leu Asn Gln
20

<210> 16
<211> 30
<212> PRT
<213> Helicobacter sp.

<400> 16
Met Ala Tyr Lys Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu
1 5 10 15

Ser Ser Asp Leu Leu Asp Leu Phe Glu Val Leu Val Phe Gly
20 25 30

<210> 17
<211> 38
<212> PRT

<213> Helicobacter sp.

<400> 17
Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu Leu Gln Tyr Tyr
1 5 10 15

Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu Gly Val Leu Tyr
20 25 30

Lys Glu Ile Leu Cys Asp
35

<210> 18
<211> 30
<212> PRT
<213> Helicobacter sp.

<400> 18
Leu Glu Glu Met Asp Asp Glu Glu Val Lys Glu Met Cys Asp Glu Leu
1 5 10 15

Ser Ile Lys Asn Thr Asp Asn Leu Asn Arg Gln Ala Leu Ser
20 25 30

<210> 19
<211> 41
<212> PRT
<213> Helicobacter sp.

<400> 19
Asn Arg Gln Ala Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly
1 5 10 15

Gly Phe Lys Ser Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala
20 25 30

Lys Thr Ile Leu Gly Arg Gly Leu Ser
35 40

<210> 20
<211> 49
<212> PRT
<213> Helicobacter sp.

<400> 20
Val Gly Trp Ile Ile Thr Gly Val Trp Thr Ala Ile Asp Ile Ala Gly
1 5 10 15

Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys Ile Val Val Ala Thr Leu
20 25 30

Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp Lys Lys Ser Leu Gln Ile
35 40 45

Glu

<210> 21
<211> 162
<212> DNA
<213> Helicobacter sp.

<400> 21
acagaaattg atggtgacgc ttatcataag ccgagtttta atgatttggg cttaaaagaa 60
tcggttttaa aatccgttta tgaagccggc ttcacttccc caagccccat tcaagaaaag 120
gccattccgg ctgttttgca aggccgagat gtcatcgcac aa 162

<210> 22
<211> 93
<212> DNA
<213> Helicobacter sp.

<400> 22
aaaaccgccg ctttcgctct gcccattatc aacaacctta aaaacaacca caccatagaa 60
gccctagtga tcacgcccac cagagaatta gcc 93

<210> 23
<211> 78
<212> DNA
<213> Helicobacter sp.

<400> 23
gccatgcaaa ttagcgatga gattttcaaa ttgggcaaac acaccaggac taaaaccgtg 60
tgcgtgtatg gaggccag 78

<210> 24
<211> 123
<212> DNA
<213> Helicobacter sp.

<400> 24
gtgatgatcg ctacaccagg aaggctgctc gatcacttaa aaaacgaacg catccataaa 60
tttgtgccta aagtggtcgt tttagatgaa agcgatgaaa tgctggatat ggggttttta 120
gac 123

<210> 25
<211> 93
<212> DNA
<213> Helicobacter sp.

<400> 25
atttttgact acctccctag cgaagcgcag attttgcttt tttcagccac gatgccagag 60
ccgattaaaa gactagcgga taagatttta gaa 93

<210> 26
<211> 69
<212> DNA

<213> Helicobacter sp.

<400> 26
aatgagcatg agagggccga agcgatcatg cgccttttag acacccaagc acccaaaaag 60
agcattgtt 69

<210> 27
<211> 108
<212> DNA
<213> Helicobacter sp.

<400> 27
gccgatgaat tgcaccaatt ccttgcttct aaaaattaca aaagcaccgc cttgcatggg 60
gatatggatc aaagggatcg gcgctcttct atcatggcgt ttaaaaaa 108

<210> 28
<211> 123
<212> DNA
<213> Helicobacter sp.

<400> 28
gggctagata ttagcggtgt aagccatgtg tttaattacc acttgcccct aaacactgag 60
agctatatcc atcgcatcgg gagaaccggg cgagcgggca aaaaaggcat ggcgatcact 120
tta 123

<210> 29
<211> 93
<212> DNA
<213> Helicobacter sp.

<400> 29
cgagcgggca aaaaaggcat ggcgatcact ttagtaaccc ctttagaata caaagagctt 60
ttacgcatgc aaaaagaaat tgattcagag att 93

<210> 30
<211> 108
<212> DNA
<213> Helicobacter sp.

<400> 30
atccccacca ttaacgaaaa tcagatcatc aaaaccttgc atgacgctaa agtgtctgaa 60
gggatcatca gcctttatga acagcttacc gaaatttttg agccgtct 108

<210> 31
<211> 63
<212> DNA
<213> Helicobacter sp.

<400> 31
tctcaattgg ttttaaaact tttgagtttg cagtttgaaa ccagcaaaat tggcttaaac 60
cag 63

<210> 32
<211> 90
<212> DNA
<213> Helicobacter sp.

<400> 32
atggcataca aatatgatag agacttggaa tttttaaagc aattggaatc tagtgattta 60
ttggatttgt ttgaggtgct tgtttttggt 90

<210> 33
<211> 114
<212> DNA
<213> Helicobacter sp.

<400> 33
gattacgcta aatacgcaga aagaatcgct gaagagttgc aatactatgg gagcaatagt 60
tttgcgagtt tcattaaagg cgaaggagtc ttatacaaag agattttatg cgat 114

<210> 34
<211> 90
<212> DNA
<213> Helicobacter sp.

<400> 34
ttggaagaaa tggatgatga agaagtgaaa gaaatgtgcg atgaattatc cataaaaaac 60
acggacaatt taaacagaca agccttaagc 90

<210> 35
<211> 108
<212> DNA
<213> Helicobacter sp.

<400> 35
aacagacaag ccttaagcgc ggcgacttta acgctgttta aaatgggggg ttttaaatct 60
tatcaattag ctgtcattgt tgcgaatgcg gtcgcaaaaa ccattcta 108

<210> 36
<211> 153
<212> DNA
<213> Helicobacter sp.

<400> 36
ggtcctgttg gctggatcat tacaggcgta tggacagcga ttgatattgc agggccggct 60
tatagggtaa ccataccggc atgcattgtg gttgccactt tacgcctaaa aacacagcaa 120
gccaatggag ataagaagtc gttgcaaata gaa 153

<210> 37
<211> 33
<212> DNA
<213> Helicobacter sp.

<400> 37
cagaggggat ccatggaatt gaatcaacca cca 33

<210> 38
<211> 36
<212> DNA
<213> Helicobacter sp.

<400> 38
cagagggtcg acttaacggc gtttgggttt tttaga 36

<210> 39
<211> 30
<212> DNA
<213> Helicobacter sp.

<400> 39
gcgggatcca tggcatacaa atatgataga 30

<210> 40
<211> 32
<212> DNA
<213> Helicobacter sp.

<400> 40
gcggtcgact taaatggatt ctatttgcaa cg 32

<210> 41
<211> 1512
<212> DNA
<213> Helicobacter sp.

<400> 41
atgagaggat cgcatcacca tcaccatcac ggatccatgg aattgaatca accaccactc 60
cctacagaaa ttgatggtga cgcttatcat aagccgagtt ttaatgattt gggcttaaaa 120
gaatcggttt taaaatccgt ttatgaagcc ggcttcactt ccccaagccc cattcaagaa 180
aaggccattc cggctgtttt gcaaggccga gatgtcatcg cacaagccca aacaggcaca 240
ggaaaaaccg ccgctttcgc tctgcccatt atcaacaacc ttaaaaacaa ccacaccata 300
gaagccctag tgatcacgcc caccagagaa ttagccatgc aaattagcga tgagattttc 360
aaattgggca aacacaccag gactaaaacc gtgtgcgtgt atggaggcca gagcgttaaa 420
aagcaatgcg aattcattaa gaaaaatccc caagtgatga tcgctacacc aggaaggctg 480
ctcgatcact taaaaaacga acgcatccat aaatttgtgc ctaaagtggt cgttttagat 540
gaaagcgatg aaatgctgga tatggggttt ttagacgata ttgaagagat ttttgactac 600
ctccctagcg aagcgcagat tttgcttttt tcagccacga tgccagagcc gattaaaaga 660
ctagcggata agattttaga aaaccctatt aaaatccata tcgctccttc taatatcact 720
aacaccgaca tcacccaacg cttttatgtg atcaatgagc atgagagggc cgaagcgatc 780
atgcgccttt tagacaccca agcacccaaa aagagcattg ttttcacgcg cactaaaaaa 840
gaagccgatg aattgcacca attccttgct tctaaaaatt acaaaagcac cgccttgcat 900
ggggatatgg atcaaaggga tcggcgctct tctatcatgg cgtttaaaaa aaatgacgct 960
gatgtgttgg tggctacaga tgtggcgagt cgtgggctag atattagcgg tgtaagccat 1020
gtgtttaatt accacttgcc cctaaacact gagagctata tccatcgcat cgggagaacc 1080
gggcgagcgg gcaaaaaagg catggcgatc actttagtaa ccccttaga atacaaagag 1140
cttttacgca tgcaaaaaga aattgattca gagattgaac tttttgaaat ccccaccatt 1200
aacgaaaatc agatcatcaa aaccttgcat gacgctaaag tgtctgaagg gatcatcagc 1260
ctttatgaac agcttaccga aatttttgag ccgtctcaat tggttttaaa acttttgagt 1320
ttgcagtttg aaaccagcaa aattggctta aaccagcaag aaattgacgc gattcaaaac 1380
cctaaagaaa aaacgccaaa accctctaac aaaaaaacgc cccaacatga gcgagcgcgt 1440

tctttcaaaa agggtcagca cagagacaga caccctaaaa caaaccatta ttctaaaaaa 1500
cccaaacgcc gt 1512

<210> 42
<211> 504
<212> PRT
<213> Helicobacter sp.

<400> 42

```
Met Arg Gly Ser His His His His His His Gly Ser Met Glu Leu Asn
  1               5                  10                  15

Gln Pro Pro Leu Pro Thr Glu Ile Asp Gly Asp Ala Tyr His Lys Pro
             20                  25                  30

Ser Phe Asn Asp Leu Gly Leu Lys Glu Ser Val Leu Lys Ser Val Tyr
         35                  40                  45

Glu Ala Gly Phe Thr Ser Pro Ser Pro Ile Gln Glu Lys Ala Ile Pro
     50                  55                  60

Ala Val Leu Gln Gly Arg Asp Val Ile Ala Gln Ala Gln Thr Gly Thr
 65                  70                  75                  80

Gly Lys Thr Ala Ala Phe Ala Leu Pro Ile Ile Asn Asn Leu Lys Asn
                 85                  90                  95

Asn His Thr Ile Glu Ala Leu Val Ile Thr Pro Thr Arg Glu Leu Ala
            100                 105                 110

Met Gln Ile Ser Asp Glu Ile Phe Lys Leu Gly Lys His Thr Arg Thr
        115                 120                 125

Lys Thr Val Cys Val Tyr Gly Gly Gln Ser Val Lys Lys Gln Cys Glu
    130                 135                 140

Phe Ile Lys Lys Asn Pro Gln Val Met Ile Ala Thr Pro Gly Arg Leu
145                 150                 155                 160

Leu Asp His Leu Lys Asn Glu Arg Ile His Lys Phe Val Pro Lys Val
                165                 170                 175

Val Val Leu Asp Glu Ser Asp Glu Met Leu Asp Met Gly Phe Leu Asp
            180                 185                 190

Asp Ile Glu Glu Ile Phe Asp Tyr Leu Pro Ser Glu Ala Gln Ile Leu
        195                 200                 205

Leu Phe Ser Ala Thr Met Pro Glu Pro Ile Lys Arg Leu Ala Asp Lys
    210                 215                 220

Ile Leu Glu Asn Pro Ile Lys Ile His Ile Ala Pro Ser Asn Ile Thr
225                 230                 235                 240

Asn Thr Asp Ile Thr Gln Arg Phe Tyr Val Ile Asn Glu His Glu Arg
                245                 250                 255
```

Ala Glu Ala Ile Met Arg Leu Leu Asp Thr Gln Ala Pro Lys Lys Ser
260 265 270

Ile Val Phe Thr Arg Thr Lys Lys Glu Ala Asp Glu Leu His Gln Phe
275 280 285

Leu Ala Ser Lys Asn Tyr Lys Ser Thr Ala Leu His Gly Asp Met Asp
290 295 300

Gln Arg Asp Arg Arg Ser Ser Ile Met Ala Phe Lys Lys Asn Asp Ala
305 310 315 320

Asp Val Leu Val Ala Thr Asp Val Ala Ser Arg Gly Leu Asp Ile Ser
325 330 335

Gly Val Ser His Val Phe Asn Tyr His Leu Pro Leu Asn Thr Glu Ser
340 345 350

Tyr Ile His Arg Ile Gly Arg Thr Gly Arg Ala Gly Lys Lys Gly Met
355 360 365

Ala Ile Thr Leu Val Thr Pro Leu Glu Tyr Lys Glu Leu Leu Arg Met
370 375 380

Gln Lys Glu Ile Asp Ser Glu Ile Glu Leu Phe Glu Ile Pro Thr Ile
385 390 395 400

Asn Glu Asn Gln Ile Ile Lys Thr Leu His Asp Ala Lys Val Ser Glu
405 410 415

Gly Ile Ile Ser Leu Tyr Glu Gln Leu Thr Glu Ile Phe Glu Pro Ser
420 425 430

Gln Leu Val Leu Lys Leu Leu Ser Leu Gln Phe Glu Thr Ser Lys Ile
435 440 445

Gly Leu Asn Gln Gln Glu Ile Asp Ala Ile Gln Asn Pro Lys Glu Lys
450 455 460

Thr Pro Lys Pro Ser Asn Lys Lys Thr Pro Gln His Glu Arg Ala Arg
465 470 475 480

Ser Phe Lys Lys Gly Gln His Arg Asp Arg His Pro Lys Thr Asn His
485 490 495

Tyr Ser Lys Lys Pro Lys Arg Arg
500

<210> 43
<211> 795
<212> DNA
<213> Helicobacter sp.

<400> 43
atgagaggat cgcatcacca tcaccatcac ggattcatgg catacaaata tgatagagac 60
ttggaatttt taaagcaatt ggaatctagt gatttattgg atttgtttga ggtgcttgtt 120
tttggtaaag acggcgaaaa aagacacaat gaaaaactga ccagctccat agaatacaaa 180

aggcatggcg atgattacgc taaatacgca gaaagaatcg ctgaagagtt gcaatactat 240
gggagcaata gttttgcgag tttcattaaa ggcgaaggag tcttatacaa agagatttta 300
tgcgatgtgt gcgataaatt aaaggtcaat tacaacaaga aaactgaaac gactttaatt 360
gaacaaaaca tgctttctaa aatcttagaa agaagtttgg aagaaatgga tgatgaagaa 420
gtgaaagaaa tgtgcgatga attatccata aaaaacacgg acaatttaaa cagacaagcc 480
ttaagcgcgg cgactttaac gctgtttaaa atgggggggtt ttaaatctta tcaattagct 540
gtcattgttg cgaatgcggt cgcaaaaacc attctagggc gtggtttatc gcttgcgggc 600
aatcaggtgc ttacaagaac tctgagcttt ttaacaggtc ctgttggctg gatcattaca 660
ggcgtatgga cagcgattga tattgcaggg ccggcttata gggtaaccat accggcatgc 720
attgtggttg ccactttacg cctaaaaaca cagcaagcca atggagataa gaagtcgttg 780
caaatagaat ccatt 795

<210> 44
<211> 265
<212> PRT
<213> Helicobacter sp.

<400> 44
Met Arg Gly Ser His His His His His His Gly Ser Met Ala Tyr Lys
1 5 10 15

Tyr Asp Arg Asp Leu Glu Phe Leu Lys Gln Leu Glu Ser Ser Asp Leu
20 25 30

Leu Asp Leu Phe Glu Val Leu Val Phe Gly Lys Asp Gly Glu Lys Arg
35 40 45

His Asn Glu Lys Leu Thr Ser Ser Ile Glu Tyr Lys Arg His Gly Asp
50 55 60

Asp Tyr Ala Lys Tyr Ala Glu Arg Ile Ala Glu Glu Leu Gln Tyr Tyr
65 70 75 80

Gly Ser Asn Ser Phe Ala Ser Phe Ile Lys Gly Glu Gly Val Leu Tyr
85 90 95

Lys Glu Ile Leu Cys Asp Val Cys Asp Lys Leu Lys Val Asn Tyr Asn
100 105 110

Lys Lys Thr Glu Thr Thr Leu Ile Glu Gln Asn Met Leu Ser Lys Ile
115 120 125

Leu Glu Arg Ser Leu Glu Glu Met Asp Asp Glu Glu Val Lys Glu Met
130 135 140

Cys Asp Glu Leu Ser Ile Lys Asn Thr Asp Asn Leu Asn Arg Gln Ala
145 150 155 160

Leu Ser Ala Ala Thr Leu Thr Leu Phe Lys Met Gly Gly Phe Lys Ser
165 170 175

Tyr Gln Leu Ala Val Ile Val Ala Asn Ala Val Ala Lys Thr Ile Leu
180 185 190

Gly Arg Gly Leu Ser Leu Ala Gly Asn Gln Val Leu Thr Arg Thr Leu
195 200 205

```
Ser Phe Leu Thr Gly Pro Val Gly Trp Ile Ile Thr Gly Val Trp Thr
    210                 215                 220

Ala Ile Asp Ile Ala Gly Pro Ala Tyr Arg Val Thr Ile Pro Ala Cys
225                 230                 235                 240

Ile Val Val Ala Thr Leu Arg Leu Lys Thr Gln Gln Ala Asn Gly Asp
                245                 250                 255

Lys Lys Ser Leu Gln Ile Glu Ser Ile
            260                 265
```